National Institute of Environmental Health Sciences

The role of climate variability in the spread of malaria in Bangladeshi highlands

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Abstract:

BACKGROUND: Malaria is a major public health problem in Bangladesh, frequently occurring as epidemics since the 1990s. Many factors affect increases in malaria cases, including changes in land use, drug resistance, malaria control programs, socioeconomic issues, and climatic factors. No study has examined the relationship between malaria epidemics and climatic factors in Bangladesh. Here, we investigate the relationship between climatic parameters [rainfall, temperature, humidity, sea surface temperature (SST), El Nino-Southern Oscillation (ENSO), the normalized difference vegetation index (NDVI)], and malaria cases over the last 20 years in the malaria endemic district of Chittagong Hill Tracts (CHT). METHODS and PRINCIPAL FINDINGS: Monthly malaria case data from January 1989 to December 2008, monthly rainfall, temperature, humidity sea surface temperature in the Bay of Bengal and ENSO index at the Nino Region 3 (NINO3) were used. A generalized linear negative binomial regression model was developed using the number of monthly malaria cases and each of the climatic parameters. After adjusting for potential mutual confounding between climatic factors there was no evidence for any association between the number of malaria cases and temperature, rainfall and humidity. Only a low NDVI was associated with an increase in the number of malaria cases. There was no evidence of an association between malaria cases and SST in the Bay of Bengal and NINO3. CONCLUSION and SIGNIFICANCE: It seems counterintuitive that a low NDVI, an indicator of low vegetation greenness, is associated with increases in malaria cases, since the primary vectors in Bangladesh, such as An. dirus, are associated with forests. This relationship can be explained by the drying up of rivers and streams creating suitable breeding sites for the vector fauna. Bangladesh has very high vector species diversity and vectors suited to these habitats may be responsible for the observed results.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3002939

Resource Description

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, El Nino Southern Oscillation, Temperature, Other Exposure

Temperature: Fluctuations

Other Exposure: sea surface temperature

Geographic Feature: ☑

resource focuses on specific type of geography

Other Geographical Feature

Other Geographical Feature : highlands

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Asia

Asian Region/Country: Other Asian Country

Other Asian Country: Bangladesh

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Malaria

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Short-Term (

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content